

LISTING OF THE CLAIMS

1. (Original) A foam composition comprising:
 - at least one fluoride compound that is free of both organoammonium and amine carboxylate compounds;
 - at least one solvent;
 - at least one gas;
 - at least one surfactant; and
 - water.
2. (Original) The foam composition of Claim 1 wherein said at least one gas is selected from the group consisting of nitrogen, argon, helium, air, oxygen, carbon dioxide, and ozone.
3. (Original) The foam composition of Claim 1 wherein said at least one surfactant is selected from the group consisting of anionic surfactants, cationic surfactants, nonionic surfactants, amphoteric surfactants, and silicone based surfactants.
4. (Original) The foam composition of Claim 1 wherein the fluoride compounds are selected from the group consisting of ammonium fluoride, ammonium bifluoride or hydrogen fluoride.
5. (Original) The foam composition of Claim 1 additionally comprising a corrosion inhibitor selected from the group consisting of catechol, t-butyl catechol, pyrogallol, gallic acid and benzotriazole.
6. (Original) The foam composition of Claim 1 additionally comprising a chelating agent.
7. (Original) The foam composition of Claim 1 wherein the fluoride compound concentration ranges from about 0.01 percent to about 5 percent by weight.
8. (Original) The foam composition of Claim 1 wherein said at least one solvent is an organic amide solvent.

9. (Original) The foam composition of Claim 8 wherein the organic amide solvent concentration range from about 20 percent to about 80 percent by weight.
10. (Original) The foam composition of Claim 8 additionally comprising up to about 50 weight percent of an organic sulfoxide solvent.
11. (Original) The foam composition of Claim 10 wherein said organic sulfoxide solvent is dimethyl sulfoxide.
12. (Original) The foam composition of Claim 1 additionally comprising an alkylamide.
13. (Original) The foam composition of Claim 1 additionally comprising an alkanolamine.
14. (Original) The foam composition of Claim 13 wherein the alkanolamine is monoethanolamine.
15. (Currently amended) The foam composition of Claim 1 wherein the ~~organic~~ solvent is a lactam.
16. (Original) The foam composition of Claim 15 wherein the lactam is selected from the group consisting of: a 5-member ring lactam substituted with an alkyl group, a 6-member ring lactam substituted with an alkyl group, a 7-member ring lactam substituted with an alkyl group, a piperidone substituted with an alkyl group, and a piperidone substituted with an alkoxy group.
17. (Original) The foam composition of Claim 16 wherein any of said alkyl groups comprises from 1 to 5 carbon atoms.
18. (Original) The foam composition of Claim 16 wherein said alkoxy group comprises from 1 to 5 carbon atoms.
19. (Original) The foam composition of Claim 16 wherein the lactam is additionally a piperidone selected from the group consisting of dialkyl, and dialkoxy-substituted piperidones.
20. (Original) The foam composition of Claim 16 wherein the piperidone substituted with an alkyl group is selected from the group consisting of N-methyl piperidone, dimethyl piperidone, N-ethyl piperidone and diethylpiperidone.

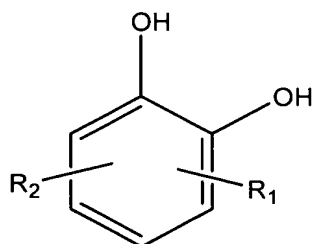
21. (Original) The foam composition of Claim 16 wherein the piperidone substituted with an alkoxy group is selected from the group consisting of: N-methoxy piperidone, dimethoxy piperidone and diethoxy piperidone.
22. (Original) The foam composition of Claim 1 wherein the water is deionized water.
23. (Original) The foam composition of Claim 1 suitable for treating a substrate having a surface to which undesired matter adheres.
24. (Original) A foam composition comprising:
 - at least one hydroxylamine;
 - at least one alkanolamine;
 - at least one gas;
 - at least one surfactant; and,
 - at least one solvent.
25. (Original) The foam composition of Claim 24 wherein said at least one gas is selected from the group consisting of nitrogen, argon, helium, air, oxygen, carbon dioxide, and ozone.
26. (Original) The foam composition of Claim 24 wherein said at least one surfactant is selected from the group consisting of anionic surfactants, cationic surfactants, nonionic surfactants, amphoteric surfactants, and silicone based surfactants.
27. (Original) The foam composition of Claim 24 wherein the hydroxylamine concentration ranges from about 5 to about 50 percent by weight.
28. (Original) The foam composition of Claim 24 wherein the at least one alkanolamine concentration ranges from about 10 to about 80 percent by weight.
29. (Original) The foam composition of Claim 24 wherein the alkanol group of the alkanolamine contains from 1 to 5 carbon atoms.
30. (Original) The foam composition of Claim 24 wherein the alkanolamine is selected from the group consisting of monoalkanolamines, dialkanolamines, and trialkanolamines.
31. (Original) The foam composition of Claim 24 wherein the alkanolamine has a formula $R_1 R_2-N-CH_2 CH_2-O-CH_2CH_2OH$ wherein R_1 and R_2 independently selected from the group consisting of H, CH_3 , CH_3CH_2 , and CH_2CH_2OH .

32. (Original) The foam composition of Claim 24 additionally comprising a chelating agent.

33. (Original) The foam composition of Claim 32 wherein the chelating agent concentration ranges from about 2.5 to about 30 percent by weight.

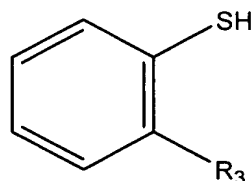
34. (Original) The foam composition of Claim 32 wherein the chelating agent is selected from the group consisting of:

(1) compounds of formula:



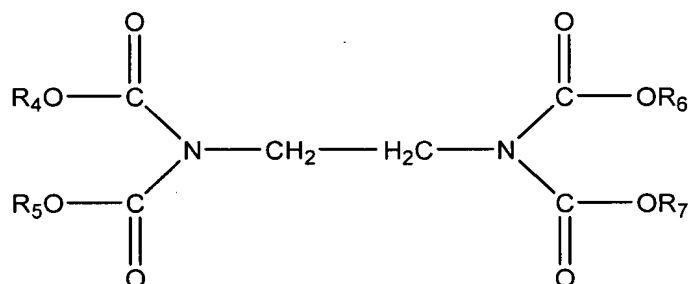
wherein R_1 and R_2 can be either H, t-butyl, OH, or COOH;

(2) compounds of formula:



wherein R_3 is either OH or COOH; and

(3) ethylene diamine tetracarboxylic acid compounds of formula:



wherein R_4 , R_5 , R_6 and R_7 can independently be either H or NH_4^+ .

35. (Original) The foam composition of Claim 24 wherein the solvent is deionized water.

36. (Original) The foam composition of Claim 24 wherein the alkanolamine is miscible with the hydroxylamine.

37. (Original) The foam composition of Claim 24 additionally comprising an acid.

38. (Original) The foam composition of Claim 37 wherein the acid is present in less than about 10% by weight.

39. (Original) The foam composition of claim 24 wherein the at least one solvent includes an organic polar solvent.

40. (Original) The foam composition of claim 39 wherein the organic polar solvent is a glycol, a glycol alkyl ether, an alkyl N-substituted pyrrolidone, ethylene diamine or ethylene triamine.

41. (Original) The foam composition of Claim 24 suitable for treating a substrate having a surface to which undesired matter adheres.

42. (Previously presented) A foam composition comprising:

- an amine;
- a hydroxylamine;
- a solvent;
- a gas; and
- a surfactant.

43. (Previously presented) The foam composition of Claim 42 wherein the amine is selected from the group consisting of choline hydroxide, choline, bis(2-hydroxyethyl) dimethylammonium hydroxide, tris(2-hydroxyethyl) dimethylammonium hydroxide, choline bicarbonate, monoethanolamine, diglycol amine, di(ethylene) triamine, and tri(ethylene) tetramine.

44. (Previously presented) The foam composition of Claim 42 wherein the amine concentration ranges from about 1 to about 60 percent by weight.

45. (Previously presented) The foam composition of Claim 42 wherein the amine concentration ranges from about 20 to about 50 percent by weight.

46. (Previously presented) The foam composition of Claim 42 wherein the amine is choline hydroxide.

47. (Previously presented) The foam composition of Claim 46 wherein the hydroxylamine is present in a concentration from about 1 to about 10 percent by weight.

48. (Cancelled)
49. (Previously presented) The foam composition of Claim 42 wherein the hydroxylamine comprises a compound selected from the group consisting of: hydroxylamine salts, hydrazine, hydrazine salts, and an organic derivative of hydroxylamine with the formula R_1R_2N-OH , wherein at least one of R_1 or R_2 is an alkyl group containing 5 or fewer carbons.
50. (Previously presented) The foam composition of Claim 49 wherein the organic derivative of hydroxylamine is di(ethyl) hydroxylamine or propyl hydroxylamine.
51. (Cancelled)
52. (Original) The foam composition of Claim 42 wherein the gas is selected from the group consisting of nitrogen, argon, helium, air, oxygen, carbon dioxide, and ozone.
53. (Original) The foam composition of Claim 42 wherein the surfactant is selected from the group consisting of: anionic surfactants, cationic surfactants, nonionic surfactants, amphoteric surfactants, and silicone based surfactants.
54. (Original) The foam composition of Claim 42 additionally comprising at least one corrosion inhibitor.
55. (Original) The foam composition of Claim 54 wherein the corrosion inhibitor is selected from the group consisting of catechol, t-butyl catechol, pyrogallol, gallic acid and benzotriazole.
56. (Previously presented) The foam composition of Claim 43 wherein the solvent is selected from the group consisting of N-methyl pyrrolidone, γ -butyrolactone, N-methyl piperidone, water and propylene glycol.
57. (Previously presented) The foam composition of Claim 43 wherein the solvent is water and its concentration ranges from about 60 to about 90 percent by weight.
58. (Previously presented) The foam composition of Claim 42 wherein the hydroxylamine concentration ranges from about 1 to about 12 percent by weight.

59. (Previously presented) The foam composition of Claim 54 wherein the corrosion inhibitor is present in a concentration that ranges from about 0.5 to about 5 percent by weight.
60. (Cancelled)
61. (Original) The foam composition of Claim 42 suitable for treating a substrate having a surface to which undesired matter adheres.
62. (Original) A foam composition comprising:
periodic acid;
at least one gas;
at least one surfactant; and,
deionized water.
63. (Original) The foam composition of Claim 62 additionally comprising at least one base selected from the group consisting of potassium hydroxide, sodium hydroxide, ammonium hydroxide, tetramethylammonium hydroxide, trimethyl(2-hydroxyethyl)ammonium hydroxide (choline), and choline derivatives.
64. (Original) The foam composition of Claim 62 additionally comprising a corrosion inhibitor selected from the group consisting of catechol, t-butyl catechol, pyrogallol, gallic acid and benzotriazole.
65. (Original) The foam composition of Claim 62 wherein the gas is selected from the group consisting of nitrogen, argon, helium, air, oxygen, carbon dioxide, and ozone.
66. (Original) The foam composition of Claim 62 wherein the surfactant is selected from the group consisting of anionic surfactants, cationic surfactants, nonionic surfactants, amphoteric surfactants, and silicone based surfactants.
67. (Original) The foam composition of Claim 62 suitable for treating a substrate having a surface to which undesired matter adheres.
68. (Original) A foam composition for treating a surface of a substrate comprising:
at least one amine;
at least one acid selected from the group consisting of citric acid, formic acid, acetic acid, propionic acid, n-butyric acid, iso-butyric acid, benzoic acid, ascorbic acid,

gluconic acid, malic acid, malonic acid, oxalic acid, succinic acid, tartaric acid, and gallic acid;

at least one gas selected from the group consisting of nitrogen, argon, helium, air, oxygen, carbon dioxide, and ozone;

at least one surfactant selected from the group consisting of anionic surfactants, cationic surfactants, nonionic surfactants, amphoteric surfactants, and silicone based surfactants, wherein at least one surfactant is suitable to allow foaming;

at least one chelating agent selected from the group consisting of ethylenediaminetetraacetic acid, citric acid, oximes, lactic acid, 8-hydroxy quinoline, salicylic acid, and salicylaldehyde;

at least one corrosion inhibitor selected from the group consisting of catechol, t-butyl catechol, pyrogallol, gallic acid and benzotriazole; and

deionized water.

69. (Original) The foam composition of Claim 68 wherein the amine is selected from the group consisting of hydroxylamine, hydroxylamine salts, hydrazine, hydrazine salts, quaternary amines, and ammonium hydroxide.

70. (Original) The foam composition of Claim 68 wherein the concentration of amines is sufficient to buffer the composition to a pH of 4 to 6.

71. (Original) The foam composition of Claim 68 wherein the concentration of acid ranges from about 2.0 to about 11 percent by weight.

72. (Original) The foam composition of Claim 68 wherein the concentration of chelating agents is less than or equal to about 1.0 percent by weight.

73. (Original) The foam composition of Claim 69 wherein the concentration of surfactants ranges from about 0.05 to about 3.0 percent by weight.

74. (Original) The foam composition of Claim 68 suitable for treating a substrate to which undesired matter adheres.

75. (Currently Amended) A foam composition comprising: a gas; a surfactant; deionized water; and a component selected from the group consisting of: a fluoride other than HF; [[a]] a hydroxylamine; an amine; and periodic acid; wherein the amine is present with a polar solvent and the amine is selected from the group consisting of: choline hydroxide; bis(2-hydroxyethyl) dimethylammonium hydroxide; diglycol amine; di(ethylene) triamine; tri(ethylene) tetramine; and choline bicarbonate.

76. (Previously presented) The foam composition of claim 75 additionally comprising a corrosion inhibitor.

77. (Previously presented) The foam composition of claim 76 additionally comprising a chelating agent.

78. (Previously presented) The foam composition of claim 76 additionally comprising a non-aqueous solvent.

79. (Previously presented) A foam composition comprising:
 an amine;
 a first solvent;
 a second solvent;
 at least one gas; and
 at least one surfactant.

80. (Previously presented) The foam composition of Claim 79 wherein the amine is selected from the group consisting of: morpholine, monoethanolamine, diglycol amine, di(ethylene triamine), tri(ethylene) tetramine, 2-methylamine ethanol, choline hydroxide, bis(2-hydroxyethyl) dimethyl-ammonium hydroxide, tris(2-hydroxyethyl)dimethylammonium hydroxide, and choline bicarbonate.

81. (Previously presented) The foam composition of Claim 80 wherein the amine is morpholine and has a concentration from about 40 to about 60 percent by weight.

82. (Previously presented) The foam composition of Claim 80 wherein the amine is 2-methylamine ethanol and has a concentration from about 1 to about 10 percent by weight.

83. (Previously presented) The foam composition of Claim 80 wherein the amine is choline hydroxide and has a concentration from about 10 to about 50 percent by weight.

84. (Previously presented) The foam composition of Claim 79 wherein the first solvent is a polar solvent.

85. (Previously presented) The foam composition of Claim 84 wherein the polar solvent is selected from the group consisting of: N-(2-hydroxyethyl)-2-pyrrolidone; dimethyl sulfoxide; di(methyl) formamide; and di(methyl) acetamide.

86. (Previously presented) The foam composition of claim 85 wherein the polar solvent is N-methyl pyrrolidone and is present in a concentration of about 20 – 50% by weight.

87. (Previously presented) The foam composition of Claim 84 wherein the polar solvent is selected from the group consisting of: γ -butyrolactone; ethylene carbonate; propylene carbonate; di(propylene glycol); monomethyl ether; ethyl lactate; propyl lactate; butyl lactate; and propylene glycol.

88. (Previously presented) The foam composition of claim 87 wherein the polar solvent is propylene glycol and is present in a concentration of about 20 – 80% by weight.

89. (Previously presented) The foam composition of Claim 79 wherein the second solvent is a polar solvent.

90. (Previously presented) The foam composition of Claim 89 wherein the polar solvent is selected from the group consisting of: γ -butyrolactone; ethylene carbonate; propylene carbonate; di(propyleneglycol) monomethyl ether; ethyl lactate; propyl lactate; butyl lactate; and propylene glycol.

91. (Previously presented) The foam composition of Claim 90 wherein the polar solvent is γ -butyrolactone and is present in a concentration from about 5 to about 25 percent by weight.

92. (Previously presented) The foam composition of Claim 89 wherein the polar solvent is selected from the group consisting of: N-methyl pyrrolidone; N-(2-hydroxyethyl)-2-pyrrolidone; dimethyl sulfoxide; di(methyl) formamide; and di(methyl) acetamide.

93. (Previously presented) The foam composition of Claim 92 wherein the polar solvent is dimethyl sulfoxide and is present in a concentration from about 20 to about 50 percent by weight.

94. (Previously presented) The foam composition of Claim 79 wherein the second solvent is water in a concentration of about 25% by weight.

95. (Previously presented) The foam composition of Claim 79 wherein the gas is selected from the group consisting of nitrogen, argon, helium, air, oxygen, carbon dioxide, and ozone.

96. (Previously presented) The foam composition of Claim 79 wherein the surfactant is selected from the group consisting of: anionic surfactants, cationic surfactants, nonionic surfactants, amphoteric surfactants, and silicone based surfactants.

97. (Previously presented) The foam composition of Claim 79 additionally comprising at least one corrosion inhibitor.

98. (Previously presented) The foam composition of Claim 97 wherein the corrosion inhibitor is selected from the group consisting of catechol, t-butyl catechol, pyrogallol, gallic acid and benzotriazole.

99. (Previously presented) The foam composition of Claim 97 wherein the corrosion inhibitor is present in an amount of up to about 5% by weight.

100. (Previously presented) The foam composition of Claim 79 suitable for treating a substrate having a surface to which undesired matter adheres.